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| 10/622,732 | 07/21/2003 | Sheng-Chih Wan | MR1035-1282 | 7607 |

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| EXAMINER | |
|---|---|
| LEURIG, SHARLENE L | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2879 | |

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/622,732 | WAN ET AL. | |
| | Examiner | Art Unit | |
| | Sharlene Leurig | 2879 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *18 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-3 and 5-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. The amendment filed on June 18, 2004 has been entered and acknowledged by the examiner.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3, 5, 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. (6,639,360) in view of Komoto et al. (6,340,824).

Roberts discloses a lamp comprising a reflecting plate (Figure 17A, elements 14 and 311; column 10, lines 50-59) having a cavity formed therein, the cavity having a longitudinally extended bottom wall (14) bounded by a plurality of reflective sidewalls (311), a transparent substrate (16) having opposing inner and outer walls, the inner wall being disposed in overlaying relationship with the reflecting plate, the transparent substrate forming a closure for the cavity. UV light is emitted by a plurality of UV light sources (12) disposed in the cavity in a side by side longitudinally spaced relationship, reflected by the reflecting plate, and a fluorescent layer formed on the transparent substrate (16) converts the light emitted by the LEDs to visible light (column 11, lines 55-57) which is then radiated from the outer wall of the transparent substrate.

Roberts fails to exemplify the material from which the reflective layer is made or a polymer mixed in with the fluorescent layer.

Komoto teaches a lamp having a UV light source with a fluorescent layer formed on a transparent substrate over a cavity containing the UV light source, the fluorescent layer containing a fluorescent powder and a macromolecular polymer solvent which remains after deposition and drying and is therefore part of the final fluorescent layer (column 21, line 51). Komoto further teaches a reflective coating of titanium dioxide mixed with a macromolecular polymer such as epoxy resin (column 48, line 66).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the lamp of Roberts to have a reflective coating of titanium dioxide and macromolecular polymer and a fluorescent layer of fluorescent powder and macromolecular polymer, as taught by Komoto, in order to provide reflective and fluorescent coatings with strong binding properties.

Regarding claim 2, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the lamp of Roberts, which has reflective sidewalls and cavity bottom, to have the reflective layer taught by Komoto comprising titanium dioxide and macromolecular polymer coated on the bottom wall as well as the sidewalls of the cavity to maximize the amount of light reaching the transparent substrate.

Regarding claim 3, the mixture of titanium dioxide and macromolecular polymer taught by Komoto reflects UV light.

Regarding claim 5, the fluorescent layer disclosed by Roberts is formed on the inner wall of the transparent substrate (16).

Regarding claim 6, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the lamp of Roberts by providing the fluorescent layer on the outer wall of the transparent substrate (16), since it has been held that a mere reversal of the essential working parts of a device involves only routine skill in the art. *In re Einstein*, 8 USPQ 167.

Regarding claim 8, the UV light sources of Roberts are UV light-emitting diodes.

4. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. (6,639,360) in view of Komoto et al. (6,340,824) and further in view of Roach et al. (6,274,978).

Roberts discloses a lamp having a plurality of UV light emitters formed in a reflective cavity, wherein the light emitted by the light emitters may be converted by a fluorescent layer, but fails to exemplify the material of the reflective coating or the material of the fluorescent layer. Roberts discloses a transparent substrate (16) formed over the cavity that may be formed of glass or plastic (column 8, lines 34-38).

Komoto teaches a UV light emitting lamp having a reflective coating of titanium dioxide and polymer formed in a cavity and a fluorescent layer having a fluorescent powder and polymer formed on a transparent subtrate.

Neither Roberts nor Komoto exemplifies the types of glass or plastic that may be used for the transparent substrate.

Roach teaches transparent materials for a transparent substrate (110) for a light emission structure, the materials comprising borosilicate glass, quartz glass, sodium-

containing glass, or plastics such as PMMA, polycarbonate or PET (polyester) (column 9, lines 33-37).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the lamp of Roberts to have a reflective coating of titanium dioxide and macromolecular polymer and a fluorescent layer of fluorescent powder and macromolecular polymer, as taught by Komoto, in order to provide reflective and fluorescent coatings with strong binding properties, and to further modify the transparent substrate of Roberts to be made of any of the glasses or plastics taught by Roach in order to provide a transparent substrate.

5. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. (6,639,360) in view of Komoto et al. (6,340,824) and further in view of Yang et al. (CN 1425621 A) (of record).

Roberts discloses a lamp having a plurality of UV light emitters formed in a reflective cavity, wherein the light emitted by the light emitters may be converted by a fluorescent layer, but fails to exemplify the material of the reflective coating or the material of the fluorescent layer. Roberts discloses a transparent substrate (16) formed over the cavity that may be formed of glass or plastic (column 8, lines 34-38).

Komoto teaches a UV light emitting lamp having a reflective coating of titanium dioxide and polymer formed in a cavity and a fluorescent layer having a fluorescent powder and polymer formed on a transparent subtrate.

Neither Roberts nor Komoto exemplifies the types of glass or plastic that may be used for the transparent substrate.

Yang teaches a transparent glass of lead-sodium silicate that attenuates UV radiation.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the lamp of Roberts to have a reflective coating of titanium dioxide and macromolecular polymer and a fluorescent layer of fluorescent powder and macromolecular polymer, as taught by Komoto, in order to provide reflective and fluorescent coatings with strong binding properties, and to further modify the transparent substrate of Roberts to be made of the lead-sodium silicate glass taught by Yang in order to provide a transparent substrate that attenuates UV radiation to protect viewers.

6. Claims 1-3, 5, 7 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubomura et al. (US 2004/0027512 A1) in view of Zou et al. (6,550,942) (of record) further in view of Hayashi et al. (6,655,810) and further in view of Lee et al. (6,705,911).

Kubomura discloses a lamp comprising a reflecting plate (Figure 2, element 30) having a cavity formed therein, said cavity having a longitudinally extended bottom wall bounded by a plurality of sidewalls. The plurality of UV (page 1, paragraph 0015) light sources (25-29) are disposed in the cavity in a side by side longitudinally spaced relationship and have a reflector provided beneath them (page 6, paragraph 0076). Kubomura further discloses a transparent substrate (21) having opposing inner and

outer walls, the inner wall being disposed in overlaying relationship with the reflecting plate, the transparent substrate forming a closure for the cavity. UV light emitted by the UV light sources is reflected by the reflecting plate and directed to the outer wall of the transparent substrate.

Kubomura fails to exemplify the type of reflective material provided underneath the light sources or reflective material provided on the sidewalls of the cavity.

Zou teaches a reflective layer (Figure 3, element 106) for a UV light source (102) completely coating the inside of the cavity in which the light source is provided. The reflective layer is formed of a macromolecular polymer mixed with titanium dioxide. Zou teaches this type of reflective layer as having very high reflectivity (column 5, line 60 to column 6, line 14).

Kubomura further lacks a fluorescent layer formed on the transparent substrate for radiating visible light.

Hayashi teaches a fluorescent powder (Figure 35, element 86) formed on a transparent substrate (93) that is disposed in an overlying relationship with a cavity containing a plurality of UV light sources, where the fluorescent powder emits light in the visible range through the transparent substrate.

Hayashi fails to exemplify the fluorescent powder being mixed with a polymer.

Lee teaches that a fluorescent powder may be mixed with a macromolecular polymer as a binding agent for better deposition (column 2, lines 56-58).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the lamp disclosed by Kubomura to have a reflective

layer formed of a polymer mixed with titanium dioxide formed both underneath the light sources and on the sidewalls of the cavity, as taught by Zou, in order to increase the reflectivity of the reflecting plate, and to thereby improve the efficiency of the lamp, to further modify the lamp of Kubomura to have a fluorescent powder formed on the transparent substrate in order to alter the emitted light to be in the visible range, as taught by Hayashi, and to further modify it to have a fluorescent powder mixed with a macromolecular polymer in order to aid in deposition, as taught by Lee.

Regarding claim 2, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the lamp of Kubomura, which has a reflector formed on the bottom wall of the cavity, to have the reflective layer taught by Zou comprising titanium dioxide and macromolecular polymer coated on the bottom wall as well as the sidewalls of the cavity to maximize the amount of light reaching the transparent substrate.

Regarding claim 3, the mixture of titanium dioxide and macromolecular polymer taught by Zou reflects UV light.

Regarding claim 5, the fluorescent layer (Figure 35D, element 86) taught by Hayashi is formed on the inner wall of the transparent substrate (93). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the lamp of Kubomura to have a fluorescent layer formed on the inside of the transparent substrate in order to convert the UV light to visible light, as taught by Hayashi, and to further modify it to have a fluorescent powder mixed with a macromolecular polymer in order to aid in deposition, as taught by Lee.

Regarding claim 7, the UV light sources of Kubomura are UV lamp tubes.

Regarding claim 9, Kubomura discloses that the transparent substrate may be made of PMMA, PC or PET (paragraph 0041).

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kubomura et al. (US 2004/0027512 A1) in view of Zou et al. (6,550,942) (of record) further in view of Hayashi et al. (6,655,810) further in view of Lee et al. (6,705,911) and further in view of Cekic et al. (6,505,948) (of record).

Kubomura discloses a lamp having a plurality of UV light emitters formed in a cavity of a reflecting plate, but lacks disclosure of the type of reflecting material or of the placement of the reflective material on the sidewalls of the cavity.

Zou teaches a reflective material of titanium dioxide and polymer formed on the whole cavity containing a UV light emitter.

Kubomura further lacks a fluorescent powder formed on the transparent substrate covering the cavity.

Hayashi teaches a fluorescent powder formed on the inside of a transparent substrate covering a cavity containing a plurality of UV light sources, in order to convert the UV light to visible light.

Hayashi fails to exemplify a polymer mixed with the fluorescent powder.

Lee teaches a macromolecular polymer mixed with a fluorescent powder in order to aid in deposition on a substrate.

None of the above references exemplify the fluorescent layer being formed on the outer wall of the transparent substrate.

Cekic teaches a fluorescent layer (Figure 6, element 112) formed on both the inside and the outside wall of a transparent substrate adjacent a cavity containing a UV light source.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the lamp structure of Kubomura to have a reflective layer formed of a polymer mixed with titanium dioxide formed both underneath the light sources and on the sidewalls of the cavity, as taught by Zou, in order to increase the reflectivity of the reflecting plate, and to thereby improve the efficiency of the lamp, to further modify the lamp of Kubomura to have a fluorescent powder formed on the transparent substrate in order to alter the emitted light to be in the visible range, as taught by Hayashi, and to further modify it to have a fluorescent powder mixed with a macromolecular polymer in order to aid in deposition, as taught by Lee, and to further modify it to have the fluorescent layer formed on the outer wall of the transparent substrate, as Cekic has taught such a placement as a suitable arrangement for the conversion of UV light to visible light.

### ***Response to Arguments***

8. Applicant's arguments with respect to claims 1-3 and 5-15 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharlene Leurig whose telephone number is (571) 272-2455. The examiner can normally be reached on Monday through Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sll

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